

AEROSPACE RESEARCH APPLICATIONS CENTER

QUARTERLY REPORT

Period Ending August 31, 1967

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By

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AEROSPACE RESEARCH APPLICATIONS CENTER  
INDIANA UNIVERSITY FOUNDATION  
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## INTRODUCTION

During the quarter covered by this report a Microcard EL-4 Document Copier was purchased and document reproduction was successfully initiated. This type of copier was selected after a thorough investigation of alternate types of equipment. The machine was installed on June 7, and document reproduction was initiated on June 8. There have been some mechanical difficulties but during this reporting period document reproduction has averaged 2071 pages per day. This figure and other data within this report are based on sample data from document reproduction activities during the period of June 8 through August 23.

## EQUIPMENT

### Selection

The model EL-4 Automatic Microfische Enlarger-Printer, manufactured by the Microcard Corporation, West Salem, Wisconsin, was selected from among several considered. The dry process employed by the EL-4 has the advantage of not requiring water connections and the handling of chemicals. Also, the EL-4 produces one document page per 8" x 10" sheet. The larger reproduction presents a more legible copy, with diagrams, charts and photographs more easily read than for those machines which produce only a 50% blow back. A report reproduced by the EL-4 is shown in Appendix A. An important basis of evaluation was telephone conversations with people in various government agencies using the various types of equipment. Agencies contacted included the Defense Documentation Center, Argonne National Laboratory, and the NASA facilities at Cambridge, Massachusetts; Hampton, Virginia; and Houston, Texas.

Another important consideration in the selection of the type of equipment was the service which could be provided by the local representative. ARAC and Indiana University have had a working relationship with the Fredrick Luther Company, Indianapolis for a number of years. They have provided excellent service on different types of equipment. They have continued to provide excellent service since the installation of the EL-4.

### Paper

The paper for the EL-4 has been the source of some problems. This paper can be purchased in 400' or 800' rolls. The 800' rolls are less expensive, and when they are used less time is required for changing rolls.

The main sources of problems have been that in some instances the last 15-20 feet of paper would turn light to dark brown after it was exposed. Several rolls of paper had a streak along the entire length of the paper due to faulty processing.

#### Equipment Performance

During the first quarter of operation there have been a number of mechanical problems. The scrapage rate during the reporting period was 15%. Most of the problems were due to lack of experience in operating the machine. Performance improved as the operators gained experience and after break-in mechanical adjustments and faulty part replacement.

A representative of the Microcard Corporation spent one day with ARAC's operating personnel and the service representatives of the Frederick Luther Company. It was necessary to call a service representative eight times for machine adjustment or repair during the reporting period. The major problems encountered and their solution were as follows:

1. Skipping Frames - Several electronic components were replaced.
2. Adding Frames - Corrected by mechanical adjustment.
3. Multiple Copies of Frame - Faulty brake on an actuating motor. Motor replaced.
4.  $\frac{1}{2}$  Frame Skip - Faulty brake on an actuating motor. Motor replaced.
5. Paper Jam or Short Paper Length - Corrected by mechanical adjustment.
6. Print too Light - Was made darker by increasing heat within drum near cutter.

#### USER EVALUATION

Two questionnaires were designed to accompany documents reproduced within the system. Three hundred copies of the first questionnaire were sent with documents. Five hundred copies of the second questionnaire are in the process of being sent out with requested documents which have been reproduced on the EL-4. The second questionnaire differs from the first in that two questions were added to those contained in the first questionnaire. The two additional questions were:

1. Would the requester of a document use the option to have the document sent by first class mail if it were available?
2. Would the document be ordered if there was a nominal charge for the document?

A copy of each questionnaire is shown in Appendix B.

An evaluation of returned questionnaires should be a guide to the user's opinion of the document service. A summary of questionnaire responses will be included in a future report.

#### COSTS

The cost figures presented within this report are based on sample data from document reproduction activities during the period of June 8 through August 23. The overhead costs which are cited include only overhead directly related to document reproduction and do not include administrative overhead.

The total cost of the project for the reporting period was \$5,577.41. The total number of pages and documents reproduced were 109,790 and 1963, respectively. This resulted in an average length of 55.93 pages per document and an average document cost of \$2.84, or \$.051 per page. The break-down of these totals may be viewed in Appendix C.

**APPENDIX A**

**Sample Document**

APPENDIX B

Questionnaire Forms

Figure 1 - Questionnaire I

Figure 2 - Questionnaire II

## APPENDIX C

### Cost Data

Figure 3 - Total Copy Cost on EL-4 Machine  
June 7 through August 23, 1967

Figure 4 - Unit Cost - EL-4

Figure 5 - Labor Cost

Figure 6 - Paper Cost

Figure 7 - Machine Rental and Covers for Documents

Figure 8 - Total Pages Copied and Total Documents Run



	<u>Quantity</u>	<u>Unit</u>	<u>Amount</u>	<u>Total</u> <u>Dollar Outlay</u>
Direct Labor (See Fig. 5)				
Clerical	20	Hours	\$ 41.14	
Service	381.75	"	651.62	
Total				\$ 692.76
Paper Cost (See Fig. 6)				2394.62
Machine Rental (See Fig. 7)				1316.64
Covers for Doc's (See Fig. 7)				31.43
Overhead (See Fig. 5)				1141.96
TOTAL COST				<u>\$5577.41</u>

Figure 3

TOTAL COPY COST ON EL-4 MACHINE  
June 7 through August 23, 1967

	<u>Total Cost</u>	<u>Unit Cost/Page</u>	<u>Unit Cost/Document*</u>
Clerical Labor	\$ 41.14	.00037	.02096
Service Labor	651.62	.00594	.33195
Overhead	<u>1141.96</u>	<u>.01040</u>	<u>.58174</u>
Subtotal	\$1834.72	.01671	.93465
Paper	2394.62	.02181	1.21988
Machine Rental	1316.64	.01199	.67073
Covers	<u>31.43</u>	<u>.00029</u>	<u>.01601</u>
TOTAL	\$5577.41	.05080	2.84127

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Total Pages Run      109,790

Total Doc's Copied      1,963

Average Pages/Doc.      55.93

\*Assumes Average of 55.93 Pages/Document

Figure 4

UNIT COST - EL-4

	<u>Hours</u>	<u>Amount</u>	<u>Overhead</u>	<u>Total</u>
June:				
Clerical Time	6.00	11.88		
Service Time	<u>132.75</u>	<u>243.82</u>		
	138.75	255.70	430.69	686.39
July:				
Clerical Time	7.00	14.63		
Service Time	<u>132.75</u>	<u>218.37</u>		
	139.75	233.00	379.17	612.17
August:				
Clerical Time	7.00	14.63		
Service Time	<u>116.25</u>	<u>189.43</u>		
	123.25	204.06	<u>332.10</u>	<u>536.16</u>
			\$1141.96	\$1834.72

Figure 5

LABOR COST

100 Rolls -	88' (16.14/roll)	\$1,614.00
100 Rolls -	400' ( 8.55/roll)	855.00
28 Rolls -	400' (10.00/roll)	280.00
		<u>\$2,749.00</u>

Less: Ending Inventory 8/23/67

17 Rolls (800') @ 16.14	274.38	
8 Rolls (400') @ 10.00	80.00	<u>354.38</u>

TOTAL PAPER COST FOR PERIOD	\$2,394.62
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TOTAL FOOTAGE RECEIVED AND USED	114,400
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Figure 6

PAPER COST

MACHINE RENTAL:

June:	433.34
July:	500.00
August (up to 23)	<u>383.30</u>
	\$1,316.64

COVERS FOR DOCUMENTS:

Price 1.67/100  
Total Doc's Run 1882

$18.82 \times 1.67 = \$31.43$

Figure 7

MACHINE RENTAL AND COVERS FOR DOCUMENTS

	<u>Pages</u>	<u>Documents</u>	<u>Ave. Pages/Doc.</u>
June:			
Doc. Service	37,987	588	64.60
IAS	1,391	30	46.37
July:			
Doc. Service	38,141	656	58.14
IAS	800	33	26.66
August:			
Doc. Service	30,529	638	47.85
IAS	862	18	47.88
	<hr/>	<hr/>	<hr/>
TOTAL	109,790	1963	55.93
Ave. Pages/Doc. - - Doc. Service		56.67	
"      "      - - IAS		38.60	

Figure 8

TOTAL PAGES COPIED AND TOTAL DOCUMENTS RUN

AEROSPACE RESEARCH APPLICATIONS CENTER  
DOCUMENT EVALUATION

ARAC is initiating a program to reproduce "N" and "AD" documents to fill your request. Document reproduction was formerly performed by NASA, but ARAC now has the capability to reproduce documents and will do so when microfiche are available. One feature of this service will be to provide a much shorter time between order placing and document receipt.

To assist us in evaluating this effort, please complete and return this form.

1. Was the time between your mailing of the order request and the receipt of the document satisfactory?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
2. Would this shorter time result in your ordering a greater volume of documents?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
3. Was the quality of the paper and reproduction satisfactory?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
4. Was the quality of the paper and reproduction an improvement over copy previously received?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
5. Do you prefer the present services and copy reproduction over the previous?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_

Figure 1

Questionnaire I

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DOCUMENT EVALUATION

ARAC has initiated a program to reproduce "N" and "AD" documents to fill your requests. Document reproduction was formerly performed by NASA, but ARAC now has the capability to reproduce documents and will do so when microfiche are available. One feature of this service will be to provide a much shorter time between order placing and document receipt.

To assist us in evaluating this effort, please complete and return this form.

1. Was the time between your mailing of the order request and the receipt of the document satisfactory?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
2. If the option were available, would you elect to pay for postage required to send documents via first-class mail? This would shorten the time between your ordering and receiving a document.  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
3. Would this shorter time result in your ordering a greater volume of documents?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
4. Was the quality of the paper and reproduction satisfactory?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
5. Was the quality of the paper and reproduction an improvement over copy previously received?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
6. Do you prefer the present service and copy reproduction over the previous?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_
7. Would you order this document if you had to pay a nominal charge (5¢ per page or \$3.00 per document)?  
YES ☐ NO ☐ COMMENTS \_\_\_\_\_  
\_\_\_\_\_

Additional comments are welcome \_\_\_\_\_  
\_\_\_\_\_

Figure 2